GEOPHYSICS®

A Journal of General and Applied Geophysics
Published by the Society of Exploration Geophysicists

Volume Contents

Volume 51, Nos. 1-12

1986

Office of Publication: SEG Headquarters, Geophysical Resource Center
8801 South Yale, Tulsa, OK 74170-2740; Phone (918) 493-3516

Robert H. Stolt, Editor
Conoco Inc. 5483RDW, Exploration Research and Development, P.O. Box 1267
Ponca City, OK 74603

©1986 by the Society of Exploration Geophysicists. All rights reserved.

Printed in the U.S.A.

GEOPHYSICS ISSN 0016-8033, December 1986, Number 12, published by the Society of Exploration Geophysicists, P.O. Box 702740, Tulsa, Oklahoma 74170-2740. Issued twelve times yearly. Second class postage paid at Tulsa and at an additional mailing office. Subscriptions are given to all members of the Society in good standing as part payment for their dues. Subcription rate for nonmembers and organizations is $145.00 per year in the U.S.A. Subscriptions outside the U.S.A. are $157.00; this includes postage. Subscription rates are subject to change without notice. Postmaster: Send address changes to Society of Exploration Geophysicists, P.O. Box 702740, Tulsa, OK 74170-2740.

VOL. 51, NO. 1 | JANUARY 1986

Instructions to Authors, *Editors of GEOPHYSICS* 3

TECHNICAL PAPERS

SEISMIC CASE HISTORY

Structural interpretation using refraction velocities from marine seismic surveys, *J. F. Mitchell and R. J. Bolander* 12

SEISMIC DATA PROCESSING

Attenuation of waterborne coherent noise by application of hyperbolic velocity filtering during the tau-*p* transform, *I. Noponen and J. Keeney* 20

Deconvolution of noisy seismic data — A method for prestack wavelet extraction, *B. J. Newman* 34

SEISMIC FIELD TECHNIQUES

Obtaining multilayer reciprocal times through phantoming, *R. W. Lankston and M. M. Lankston* 45

SEISMIC THEORY

Zero-offset reflections from a curved interface, *B. Ursin* 50

The application of high-order differencing to the scalar wave equation, *M. A. Dablain* 54

SEISMIC VSP

Reverse-time migration of offset vertical seismic profiling data using the excitation-time imaging condition, *W. F. Chang and G. A. McMechan* 67

ELECTRICAL AND ELECTROMAGNETIC

Spatial and temporal analysis of electromagnetic survey data, *N. R. Garg and G. V. Keller* 85

An objective real-time data-adaptive technique for efficient model resolution improvement in magnetotelluric studies, *A. G. Jones and J. H. Foster* 90

Three-dimensional mise-à-la-masse modeling applied to mapping fracture zones, *C. W. Beasley and S. H. Ward* 98

GRAVITY AND MAGNETICS

Gravity interpretation using the Mellin transform, *N. L. Mohan, L. Anandababu, and S. V. Seshagiri Rao* 114

Depth estimates from ratios of gravity, geoid, and gravity gradient anomalies, *C. Bowin, E. Scheer, and W. Smith* 123

Table of Contents continued

JANUARY 1986 continued

Technical Papers, *continued*

WELL LOGGING

Shear velocity logging in slow formations using the Stoneley wave, *J. L. Stevens and S. M. Day* **137**

Acoustic multipole sources in fluid-filled boreholes, *A. L. Kurkjian and S-K. Chang* **148**

ROCK PROPERTIES

Experimental determination of elastic anisotropy of Berea sandstone, Chicopee shale, and Chelmsford granite, *T-W. Lo, K. B. Coyner, and M. N. Toksöz* **164**

Dielectric properties of pyrite samples at 1 100 MHz, *M. J. Manning and K. A. Athavale* **172**

Estimates of velocity dispersion between seismic and ultrasonic frequencies, *K. W. Winkler* **183**

SHORT NOTE

Velocity analysis for feathered marine data, *A. K. Kalra* **190**

DISCUSSIONS

On: "Important design considerations for inboard airborne magnetic gradiometers" (C. D. Hardwick), *by P. Hood* **with reply by author 192**

On: "The electrochemical mechanism of sulfide self-potentials" (M. Sato and H. M. Mooney), *by S. V. Burr* **with reply by author 194**

DEPARTMENTS

Reviews 197
Abstracts
Patents 199
Geophysical Prospecting **201**
Papers from other journals 203
International scientific advances
Geophysics in India 205
Geothermal in Italy 208
New publications received 210
Errata 210

Next month in GEOPHYSICS 211
Memorial
R. Jeffrey Lytle 212
Contributors to this issue 213
Announcements 216
Calendar of events 218
Professional directory — see Advertisers index
Advertisers index A-25

VOL. 51, NO. 2 | FEBRUARY 1986

SPECIAL ISSUE
Engineering and Groundwater
P. R. Romig, Editor

TECHNICAL PAPERS

Introduction to Special Issue, *P. R. Romig* **221**

Resolution of ambiguities of seismic refraction traveltime curves, *H. D. Ackermann, L. W. Pankratz, and D. Dansereau* **223**

Application of seismic refraction methods in groundwater modeling studies in New England, *F. P. Haeni* **236**

Attenuation measurements on shallow seismic refraction data, *P. J. Hatherly* **250**

Experience with the generalized reciprocal method of seismic refraction interpretation for shallow engineering site investigation, *P. J. Hatherly and M. J. Neville* **255**

Seismic refraction at Horse Mesa Dam: An application of the generalized reciprocal method, *K. T. Kilty, R. A. Norris, W. R. McLamore, K. P. Hennon, and K. Euge* **266**

High-resolution common-depth-point seismic reflection profiling: Instrumentation, *R. W. Knapp and D. W. Steeples* **276**

High-resolution common-depth-point reflection profiling: Field acquisition parameter design, *R. W. Knapp and D. W. Steeples* **283**

Seismic reflection investigations of sinkholes beneath Interstate Highway 70 in Kansas, *D. W. Steeples, R. W. Knapp, and C. D. McElwee* **295**

Seismic attenuation spectra in rock mass characterization: A case study in open-pit mining, *R. P. Young and J. J. Hill* **302**

Regular Issue

SEISMIC DATA PROCESSING

Migration of common shot gathers, *M. Reshef and D. Kosloff* **324**

Automatic estimation of large residual statics corrections, *D. H. Rothman* **332**

SEISMIC THEORY

The special features of *P-S* arrivals, *G. Nedlin* **347**

A new formulation of dip and depth to a dipping reflector beneath $V = V_o (1 + KZ)$, *T. Kayiran* **353**

Robust iterative inversion for the one-dimensional acoustic wave equation, *A. Gersztenkorn, J. B. Bednar, and L. R. Lines* **357**

Table of Contents continued

Regular Issue, continued

GRAVITY AND MAGNETICS

Reduction to the pole as an inverse problem and its application to low-latitude anomalies, *J. B. C. Silva* **369**

ELECTRICAL AND ELECTROMAGNETIC

Inversion of magnetotelluric data using a practical inverse scattering formulation, *K. P. Whittall and D. W. Oldenburg* **383**

A novel ground electromagnetic system, *I. M. Johnson and Z. B. Doborzynski* **396**

SHORT NOTES

Stabilization of bottom-hole temperature in the presence of formation fluid flows, *F. B. Ribeiro and V. M. Hamza* **410**

Errors in depth computation, *R. F. Stöckli* **414**

The Fourier transform of 1/r, *M. Craig* **417**

A plane-wave decomposition for elastic wave fields applied to the separation of *P*-waves and *S*-waves in vector seismic data, *A. J. Devaney and M. L. Oristaglio* **419**

A simple method for determining the S80 water gun depth, *M. H. Safar* **424**

SEG ANNUAL MEETING ABSTRACTS

Abstracts of papers presented at the 55th Annual Meeting 427

DEPARTMENTS

Reviews 510
Patent abstracts 512
New publications received 514
***Geophysical Prospecting* abstracts 515**
New SEG publications 516
International scientific advances 517
Papers from other journals 520
Next month in GEOPHYSICS 521
Contributors to this issue 522
Errata 525
Announcements 526
Calendar of events 528
Professional directory — see Advertisers index
Advertisers index A-17

VOL. 51, NO. 3 | MARCH 1986

Editorials
Books, *Stanley B. Jones* 531
FINIS!, *Stanley H. Ward* 532

SPECIAL ISSUE
Geophysics in Archaeology
J. C. Wynn, Editor

TECHNICAL PAPERS
Archaeological prospection: An introduction to the Special Issue, *J. C. Wynn* 533
Archaeological site surveying program at the University of Nebraska, *J. W. Weymouth* 538
Magnetic prospection on prehistoric sites in Western Canada, *T. H. Gibson* 553
Geophysical results in archaeology in Hungary, *M. Pattantyus-A.* 561
Archaeological applications of resistivity and magnetic methods at Fort Wilkins State Park, Michigan, *C. T. Young and D. R. Droege* 568
Applications and advantages of the Slingram electromagnetic method for archaeological prospecting, *A. Tabbagh* 576
New prospects in shallow depth electrical surveying for archaeological and pedological applications, *A. Hesse, A. Jolivet, and A. Tabbagh* 585
Ground-penetrating radar surveys used in archaeological investigations, *C. J. Vaughan* 595
Evaluation of archaeological site potential on the Gulf of Mexico continental shelf using high-resolution seismic data, *M. J. Stright* 605
Display of archaeological magnetic data, *I. Scollar, B. Weidner, and K. Segeth* 623
The scatter of magnetic directions in archaeomagnetic studies, *D. H. Tarling, N. B. Hammo, and W. S. Downey* 634

Regular Issue

INTEGRATED CASE HISTORY
Seismic reflection profiling studies of a buried Precambrian rift beneath the Wabash Valley fault zone, *J. L. Sexton, L. W. Braile, W. J. Hinze, and M. J. Campbell* 640

SEISMIC CASE HISTORY
Anisotropy effects in *P*-wave and *SH*-wave stacking velocities contain information in lithology, *D. F. Winterstein* 661

SEISMIC DATA PROCESSING
Seismic mis-tie adjustment procedure (SMAP) using a minimax-minisum strategy, *G. J. Indelicato and G. C. Moore* 673

Table of Contents continued

Regular Issue, continued

SEISMIC THEORY

Phase offset indicator (POI): A study of phase shift versus offset and fluid content, *B. Rafipour and E. Herrin* **679**

Acoustic response of manganese nodule deposits, *Y. Ma, A. H. Magnuson, V. K. Varadan, and V. V. Varadan* **689**

Layers and bright spots, *H. Almoghrabi and J. Lange* **699**

Synthetic seismic sections for acoustic, elastic, anisotropic, and vertically inhomogeneous layered media, *F. Hron, B. T. May, J. D. Covey, and P. F. Daley* **710**

When reflection coefficients are zero, *F. K. Levin* **736**

Biot-Gardner theory of extensional waves in porous rods, *J. E. White* **742**

Wave propagation from an explosive source, *F. Jalinoos and J. E. White* **746**

Acoustic relaxation in sedimentary rocks: Dependence on grain contacts and fluid saturation, *W. F. Murphy III, K. W. Winkler, and R. L. Kleinberg* **757**

HEAT FLOW AND GEOTHERMAL

Geothermics of the Williston Basin in Canada in relation to hydrodynamics and hydrocarbon occurrences, *J. A. Majorowicz, F. W. Jones, and A. M. Jessop* **767**

WELL LOGGING

Application of the maximum-likelihood method (MLM) for sonic velocity logging, *K. Hsu and A. B. Baggeroer* **780**

BOREHOLE GEOPHYSICS

Hole-to-hole resistivity signatures of cylindrical cavities: Dipole-dipole electrode array, *J. O. Parra and T. E. Owen* **788**

Theory of induction sonde in dipping beds, *R. H. Hardman and L. C. Shen* **800**

ELECTRICAL AND ELECTROMAGNETIC

A comparison of electromagnetic exploration systems, *K. G. McCracken, M. L. Oristaglio, and G. W. Hohmann* **810**

The minimization of noise in electromagnetic exploration systems, *K. G. McCracken, M. L. Oristaglio, and G. W. Hohmann* **819**

ENGINEERING AND GROUNDWATER

Application of the pole-dipole resistivity technique to the detection of solution cavities beneath highways, *D. L. Smith* **833**

SHORT NOTES

Multichannel estimate of the seismic wavelet, *J. E. Thomas* **838**

Noise suppression by the radial amplitude-slope rejection method, *D. B. Neff and S. B. Wyatt* **844**

DEPARTMENTS

Reviewers for GEOPHYSICS 1985 851
Reviews 854
New publications received 856
Abstracts
SEG seismic field techniques workshop 857
Geophysical Prospecting **874**
Patents 876
International scientific advances
Acquifer evaluation in Mexico 877
Papers from other journals 878
Errata 879
Next month in GEOPHYSICS 879
Contributors to this issue 880
Announcements 886
Calendar of events 888
Professional directory — see Advertisers index
Advertisers index A-32

VOL. 51, NO. 4 | APRIL 1986

TECHNICAL PAPERS

SEISMIC THEORY

P-SV wave propagation in heterogeneous media: Velocity-stress finite-difference method, *J. Virieux* 889

WELL LOGGING AND BOREHOLE GEOPHYSICS

Synthetic full waveform acoustic logs in cased boreholes II. Poorly bonded casing, *K. M. Tubman, C. H. Cheng, S. P. Cole, and M. N. Toksöz* 902

Application of cross-hole seismic measurements in site investigation surveys, *D. M. McCann, R. Baria, P. D. Jackson, and A. S. P. Green* 914

Theoretical far-field radiation from low-frequency horizontal acoustic point force in a vertical borehole, *A. L. Kurkjian* 930

VERTICAL SEISMIC PROFILING

Radon transform wave field separation for vertical seismic profiling data, *W. Moon, A. Carswell, R. Tang, and C. Dilliston* 940

ROCK PROPERTIES

Fluid pressure response to undrained compression in saturated sedimentary rock, *D. H. Green and H. F. Wang* 948

ELECTRICAL AND ELECTROMAGNETIC

Transient electromagnetic response of the Teutonic Bore orebody, *G. Buselli, K. G. McCracken, and M. Thorburn* 957

The effect of structure and anisotropy on resistivity measurements, *M. J. S. Matias and G. M. Habberjam* 964

Analysis of multiple-source bipole-quadripole resistivity surveys using the apparent resistivity tensor, *H. M. Bibby* 972

A transient electric dipole-dipole method for mapping the conductivity of the sea floor, *R. N. Edwards and A. D. Chave* 984

GRAVITY

Gravity inversion using open, reject, and "shape-of-anomaly" fill criteria, *R. M. René* 988

TUTORIAL, ENGINEERING AND GROUNDWATER

Transient electromagnetic sounding for groundwater, *D. V. Fitterman and M. T. Stewart* 995

SHORT NOTES

Real data results of Kirchhoff elastic wave migration, *T-F. Dai and J. T. Kuo* 1006

Apparent axial properties of transversely isotropic media, *B. S. Byun and S-C. W. Cheng* 1012

An alternate derivation of the three-dimensional Hilbert transform relations from first principles, *J. B. Nelson* 1014

DISCUSSIONS

On: "The influence of pore pressure and confining pressure on dynamic elastic properties of Berea sandstone" (N. I. Christensen and H. F. Wang), *by G. H. F. Gardner* with reply by authors 1016

On: "Radio-frequency geotomography for remotely probing the interiors of operating mini- and commercial sized oil-shale retorts" (S. F. Somerstein, M. Berg, D. Chang, H. Chung, H. Johnson, B. Richardson, J. Pizzicara, and W. W. Salisbury), *by R. N. Singh* with reply by authors 1018

REPORT

International Geomagnetic Reference Field Revision 1985 by IAGA Division I, Working Group 1, *Norman W. Peddie* 1020

DEPARTMENTS

Reviews 1024

New publications received 1026

Abstracts
Geophysical Prospecting 1027
Patents 1029

International scientific advances
Applied Geophysics in Thailand 1031

Next month in GEOPHYSICS 1032

Errata 1033

Contributors to this issue 1034

Announcements 1036

Calendar of events 1038

Professional Directory — see Advertisers index

Advertisers index A-32

VOL. 51, NO. 5 | MAY 1986

TECHNICAL PAPERS

SEISMIC CASE HISTORIES AND INTERPRETATION

Geophysical case history, Prudhoe Bay field, *R. N. Specht, A. E. Brown, C. H. Selman, and J. H. Carlisle* **1039**

Signal penetration in the COCORP Basin and Range-Colorado plateau survey, *James R. Mayer and Larry D. Brown* **1050**

SEISMIC THEORY

Inversion of *P-SV* seismic data, *James J. Carazzone* **1056**

Using multiparameter Born theory to obtain certain exact multiparameter inversion goals, *Arthur B. Weglein, Paul B. Violette, and Timothy H. Keho* **1069**

Transition zone reflections and permafrost analysis, *James H. Justice and Chris Zuba* **1075**

VERTICAL SEISMIC PROFILES

Vertical seismic profiling depth migration of a salt dome flank, *N. D. Whitmore and Larry R. Lines* **1087**

WELL LOGGING AND BOREHOLE GEOPHYSICS

Prompt neutron-gamma logging for coal ash in water-filled boreholes, *J. Charbucinski, S. F. Youl, P. L. Eisler, and M. Borsaru* **1110**

GRAVITY AND MAGNETICS

A simple method for the analysis of magnetic anomalies over dike-like bodies, *H. V. Ram Babu, V. Vijayakumar, and D. Atchuta Rao* **1119**

A gravity model of the basement structure in the Santa Maria basin, California, *Paul M. Kieniewicz and Bruce P. Luyendyk* **1127**

Uniform norm minimization in three dimensions, *Stephen P. Huestis* **1141**

SHORT NOTE

Convergence of iterative gravity inversion, *Harald Granser* **1146**

DISCUSSIONS

On: "Vertical seismic profiling: Separation of upgoing and downgoing acoustic waves in a stratified medium" (B. Seeman and L. Horowicz), *by S. D. Stainsby and M. H. Worthington* **with reply by author 1148**

On: "The inverse problem of resistivity sounding" (R. L. Parker), *by E. Szaraniec* **with reply by author 1151**

On: "Spontaneous polarization associated with porphyry sulfide mineralization" (C. E. Corry), *by George W. Leney* **with reply by author 1153**

DEPARTMENTS

Reviews 1156
New publications received 1159
Abstracts
1986 Midwest Meeting 1160
Patents 1169
International scientific advances
Applied geophysics in Brazil 1171
Papers from other journals 1174
Next month in GEOPHYSICS 1174
Contributors to this issue 1175
Announcements 1177
Calendar 1178
Gold and Silver Certificates 1179
Advertisers Index A-32

VOL. 51, NO. 6 | JUNE 1986

TECHNICAL PAPERS

BOREHOLE GEOPHYSICS AND WELL LOGGING

A Fourier method for borehole electromagnetic problems, *A. Q. Howard, Jr.* **1181**

Fluid and solid motion in the neighborhood of a fluid-filled borehole due to the passage of a low-frequency elastic plane wave, *M. Schoenberg* **1191**

SEISMIC DATA PROCESSING

Maximum-likelihood deconvolution: An optimization theory perspective, *J. Goutsias and J. M. Mendel* **1206**

Design and applications of optimum multichannel linear moveout filters, *H. Özdemir* **1221**

Multicomponent seismic studies using complex trace analysis, *R. M. René, J. L. Fitter, P. M. Forsyth, K. Y. Kim, D. J. Murray, J. K. Walters, and J. D. Westerman* **1235**

VERTICAL SEISMIC PROFILING

Theoretical vertical seismic profiling seismograms, *M. Suprajitno and S. A. Greenhalgh* **1252**

SEISMIC MIGRATION AND INVERSION

Linearized inversion of multioffset seismic reflection data in the ω-k domain, *L. T. Ikelle, J. P. Diet, and A. Tarantola* **1266**

POTENTIAL METHODS

Determination of crustal interface topography from potential fields, *M. Pilkington and D. J. Crossley* **1277**

ROCK PROPERTIES

The effect of the extent of freezing on seismic velocities in unconsolidated permafrost, *R. W. Zimmerman and M. S. King* **1285**

ELECTRICAL AND ELECTROMAGNETIC

A single apparent resistivity expression for long-offset transient electromagnetics, *Y. Sheng* **1291**

MAGNETOTELLURIC TUTORIAL

Geoelectric structural dimensions from magnetotelluric data: Methods of estimation, old and new, *D. Beamish* **1298**

DEPARTMENTS

Letter to the Editor 1310
Reviews 1311
New publications received 1314
Abstracts
1986 Gulf Coast Meeting 1315
Patents 1330
International scientific advances
Australia 1331
Papers from other journals 1333
Errata 1335
Next month in GEOPHYSICS 1335
Memorial
E. S. Driver 1336
Contributors to this issue 1337
Announcements 1339
Calendar 1340
Advertisers index A-22

VOL. 51, NO. 7 | JULY 1986

TECHNICAL PAPERS

SEISMIC DATA PROCESSING

Simultaneous pre-normal moveout and post-normal moveout deconvolution, *J. F. Claerbout* **1341**

Prestack layer replacement, *O. Yilmaz and D. Lucas* **1355**

A slant-stack procedure for point-source data, *H. Brysk and D. W. McCowan* **1370**

SEISMIC MIGRATION AND INVERSION

Two-dimensional nonlinear inversion of seismic waveforms: Numerical results, *O. Gauthier, J. Virieux, and A. Tarantola* **1387**

ARCHAEOLOGICAL GEOPHYSICS

Archaeological geophysics in Britain, *A. J. Clark* **1404**

Electromagnetic surveying in current Middle Eastern archaeology: Application and evaluation, *B. Frohlich and W. J. Lancaster* **1414**

MINING GEOPHYSICS

Shallow seismic reflection investigations of coal in the Sydney Basin, *S. A. Greenhalgh, M. Suprajitno, and D. W. King* **1426**

BOREHOLE GEOPHYSICS AND WELL LOGGING

A numerical investigation of head waves and leaky modes in fluid-filled boreholes, *F. L. Paillet and C. H. Cheng* **1438**

ELECTRICAL AND ELECTROMAGNETIC METHODS

A finite-element solution for the transient electromagnetic response of an arbitrary two-dimensional resistivity distribution, *Y. Goldman, C. Hubans, S. Nicoletis, and S. Spitz* **1450**

The use and misuse of apparent resistivity in electromagnetic methods, *B. R. Spies and D. E. Eggers* **1462**

GRAVITY AND MAGNETICS

MAGSAT scalar anomaly map of South America, *J. R. Ridgway and W. J. Hinze* **1472**

Evaluation of the BGM-3 sea gravity meter system onboard *R/V Conrad,* *R. E. Bell and A. B. Watts* **1480**

SHORT NOTES

Approximating edges of source bodies from magnetic or gravity anomalies, *R. J. Blakely and R. W. Simpson* **1494**

An empirical study of instability and improvement of absorbing boundary conditions for the elastic wave equation, *K. D. Mahrer* **1499**

DISCUSSIONS

On: "Airborne gravity is here!" (S. Hammer and M. J. Hall) *by F. B. Davies* **with reply by author 1502**

On: "Well logging — A 25-year perspective" (D. D. Snyder and D. B. Fleming), *by H. W. Hardy* **with reply by authors 1504**

On: "The normal vertical gradient of gravity" (J. H. Karl), *by T. R. LaFehr and K. C. Chan* **1505**

DEPARTMENTS

Reviews 1509
Abstracts
USN/SEG joint technical symposium 1511
***Geophysical Prospecting* 1520**
Patents 1521
Errata 1519

Papers from other journals 1523
Contributors to this issue 1526
Announcements 1528
Calendar 3rd Cover
Advertisers Index A-18

VOL. 51, NO. 8 | AUGUST 1986

Editorial: Discussions 1529
Letter to the Editor 1530

TECHNICAL PAPERS

SEISMIC THEORY

Stratigraphic filter theory: Combined effects of parallel bedding and random inhomogeneities, *I. Lerche* 1531

SEISMIC MIGRATION AND INVERSION

Wave-field extrapolation by the linearly transformed wave equation, *Z. Li* 1538

Three-dimensional Born inversion with an arbitrary reference, *J. K. Cohen, F. G. Hagin, and N. Bleistein* 1552

Three-dimensional determination of structure and velocity by seismic tomography, *S. K. L. Chiu, E. R. Kanasewich, and S. Phadke* 1559

SEISMIC DATA PROCESSING

Submarine canyons: Velocity replacement by wave-equation datuming before stack, *J. A. Berryhill* 1572

ROCK PROPERTIES

A simple method for the absolute measurement of thermal conductivity of drill cuttings, *T-C. Lee, T. L. Henyey, and B. N. Damiata* 1580

Electrical conductivity of brine-saturated fractured rock, *R. M. Stesky* 1585

ELECTRICAL AND ELECTROMAGNETIC

Computation of apparent resistivities using an exponential approximation of kernel functions, *S. Niwas and M. Israil* 1594

Inversion of magnetotelluric data using localized conductivity constraints, *K. P. Whittall* 1603

Transient electromagnetic response of a three-dimensional body in a layered earth, *G. A. Newman, G. W. Hohmann, and W. L. Anderson* 1608

ELECTROMAGNETIC CASE HISTORY

Scalar-audiomagnetotellurics applied to base-metal exploration in Finland, *E. Lakanen* 1628

GRAVITY

Analysis of exploitation-induced gravity changes at Wairakei geothermal field, *R. G. Allis and T. M. Hunt* 1647

GEOTHERMAL EXPLORATION

An investigation of the potential for geothermal energy recovery in the Calgary area in southern Alberta, Canada, using petroleum exploration data, *H. L. Lam and F. W. Jones* 1661

AEROMAGNETIC INTERPRETATION

The effects of cathodically protected pipelines on aeromagnetic surveys, *S. P. Gay, Jr.* 1671

SHORT NOTES

Efficient traveltime calculations for Kirchhoff migration, *S. H. Gray* 1685

A simplified fast method of deriving weathering corrections, *M. H. Morsi* 1689

DISCUSSION

On: "Application of Gauss's method to magnetic anomalies of dipping dikes" (I. J. Won), *by C. V. Rao* with reply by author 1691

DEPARTMENTS

Reviews 1692
Abstracts
Geophysical Prospecting 1695
Patents 1697
PBGS meeting 1700
International scientific advances
Argentina 1703
New publications received 1704
Papers from other journals 1705
Memorial
Burl A. Tuller 1706
Contributors to this issue 1707
Announcements 1708
Next month in GEOPHYSICS 1709
Calendar 1710
Professional directory A-12
Advertisers index A-16

VOL. 51, NO. 9 | SEPTEMBER 1986

TECHNICAL PAPERS

GRAVITY AND MAGNETICS

Magnetic susceptibility anomalies of lithosphere beneath eastern Europe and the Middle East, *J. Arkani-Hamed and D. W. Strangway* **1711**

A comparison of methods for approximating the vertical gradient of one-dimensional magnetic field data, *J. W. Paine* **1725**

SEISMIC DATA ACQUISITION

Alternative processing techniques and data improvement provided by single-sweep recording, *S. W. Belcher, T. L. Pratt, J. K. Costain, and C. Coruh* **1736**

Geophone differencing to attenuate horizontally propagating noise, *R. W. Knapp* **1743**

SEISMIC INTERPRETATION

Evidence of recurrent faulting in the New Madrid seismic zone from Mini-Sosie high-resolution reflection data, *J. L. Sexton and P. B. Jones* **1760**

SEISMIC MIGRATION AND INVERSION

Plane-layer prestack inversion in the presence of surface reverberation, *A. D. McAulay* **1789**

BOREHOLE GEOPHYSICS AND WELL LOGGING

Low-frequency radiation from point sources in a fluid-filled borehole, *M. W. Lee* **1801**

ELECTRICAL AND ELECTROMAGNETIC METHODS

Polymetallic sulfide exploration on the deep sea floor: The feasibility of the Mini-Moses technique, *P. A. Wolfgram, R. N. Edwards, L. K. Law, and M. N. Bone* **1808**

An analysis of the magnetotelluric impedance for three-dimensional conductivity structures *G. A. LaTorraca, T. R. Madden, and J. Korringa* **1819**

Theoretical modeling of induced-polarization logging in a borehole, *R. Freedman and J. P. Vogiatzis* **1830**

SHORT NOTES

Time-domain solution for horizontal coaxial dipoles on a half-space, *D. C. Bartel* **1850**

Observations of the air-coupled wave as a function of depth, *R. W. Knapp* **1853**

Reflection coefficients at pore-fluid contacts as a function of offset, *J. Wright* **1858**

DISCUSSION

On: "A geophone subarray beam-steering process" (D. E. Biswell, L. F. Konty, and A. L. Liaw), *by Carl H. Savit* **1861**

DEPARTMENTS

Reviews 1862
Abstracts
Patents 1865
Geophysical Prospecting **1868**
Errata 1869
International scientific advances
Netherlands 1870
Papers from other journals 1872
Contributors to this issue 1874
Announcements 1876
Next month in GEOPHYSICS 1877
Calendar 1878
1986 Annual Meeting
Technical Program A-17
Professional directory A-34
Advertisers index A-38

VOL. 51, NO. 10 | OCTOBER 1986

TECHNICAL PAPERS

SEISMIC PROCESSING

The Nth-root stack: Theory, applications, and examples, *P. McFadden, B. Drummond, and S. Kravis* **1879**

SEISMIC MIGRATION AND INVERSION

A strategy for nonlinear elastic inversion of seismic reflection data, *A. Tarantola* **1893**

Traveltime inversion for the flat-layer model, *J. H. Justice* **1904**

SEISMIC THEORY

***t-x* reflection curves for arbitrary three-dimensional media in terms of geometry of a reflector and a near-reflector wavefront,** *G. Nedlin* **1912**

VERTICAL SEISMIC PROFILING

Reconstruction of reflecting structures from vertical seismic profiles with a moving source, *K. Kohler and M. Koenig* **1923**

ROCK PROPERTIES

Pore fluids and frequency-dependent wave propagation in rocks, *T. D. Jones* **1939**

Weak elastic anisotropy, *L. Thomsen* **1954**

ELECTRICAL AND ELECTROMAGNETIC METHODS

Self-potential variations with time and their relation to hydrogeological and meteorological parameters, *K. Ernstson and H. U. Scherer* **1967**

Effects of geologic noise on cross-borehole electrical surveys, *J. S. Zhao, L. Rijo, and S. H. Ward* **1978**

MAGNETICS

A new shipboard three-component magnetometer, *N. Isezaki* **1992**

SHORT NOTES

Map displays from an interactive interpretation, *J. I. Denham and H. R. Nelson, Jr.* **1999**

On the effect of recording aperture in migration of vertical seismic profiling data, *G. McMechan and L.-Z Hu* **2007**

DISCUSSION

On: "High-resolution common-depth-point reflection profiling: Field acquisition parameter design (R. W. Knapp and D. W. Steeples), *by W. Harry Mayne* **with reply by authors 2011**

SPECIAL REPORT

1985 SEG Workshops 2013

DEPARTMENTS

Reviews 2019
Abstracts
Geophysical Prospecting **2022**
Patents 2024
Next month in GEOPHYSICS 2025
Papers from other journals 2026
Contributors to this issue 2027
New SEG publications 2028
Announcements 2029
Calendar of events 2030
Professional directory A-8
Advertisers index A-14

VOL. 51, NO. 11 | NOVEMBER 1986

TECHNICAL PAPERS

SEISMIC THEORY

Exact inversion of plane-layered isotropic and anisotropic elastic media by the state-space approach, *M. Meadows and S. Coen* **2031**

DATA PROCESSING

A least-squares smooth fitting for irregularly spaced data: Finite-element approach using cubic B-spline basis, *H. Inoue* **2051**

ENGINEERING AND GROUNDWATER

Field comparison of shallow seismic sources, *R. D. Miller, S. E. Pullan, J. S. Waldner, and F. P. Haeni* **2067**

ROCK PROPERTIES

Effects of porosity and clay content on wave velocities in sandstones, *D. H. Han, A. Nur, and D. Morgan* **2093**

REMOTE SENSING

The altitude dependence of terrestrial gamma-ray spectra: A simple model, *R. C. Bailey* **2108**

ELECTRICAL AND ELECTROMAGNETIC METHODS

Three-dimensional transient electromagnetic responses for a grounded source, *B. M. Gunderson, G. A. Newman, and G. W. Hohmann* **2117**

Two-dimensional topographic responses in magnetotellurics modeled using finite elements, *P. E. Wannamaker, J. A. Stodt, and L. Rijo* **2131**

GRAVITY AND MAGNETICS

Isomorphic geodetic and electrical networks: An application to the analysis of airborne gravity gradiometer survey data, *D. Eckhardt* **2145**

SHORT NOTES

Nomogram for the direct interpretation of magnetic anomalies due to long horizontal cylinders, *T. K. S. Prakasa Rao, M. Subrahmanyam, and A. Srikrishna Murthy* **2156**

Acoustic reflections from undulating surfaces, *N. R. Hill and I. Lerche* **2160**

REPORT

COCORP: N. California-Nevada area and Southern Appalachian area. Part III, *S. Kaufman* **2162**

DEPARTMENTS

Reviews 2164
New publications received 2167
Patent abstracts 2168
International scientific advances 2172
Contributions to this issue 2173
New SEG publications 2174
Announcements 2175
Next month in GEOPHYSICS 2175
Calendar 2176
Professional directory A-17
Advertisers index A-22

VOL. 51, NO. 12 | DECEMBER 1986

TECHNICAL PAPERS

SEISMIC METHODS

Deep-water peglegs and multiples: Emulation and suppression, *J. R. Berryhill and Y. C. Kim* **2177**

***k-t* scattering formulation of the absorptive acoustic wave equation: Wraparound and edge-effect elimination** *B. Compani-Tabrizi* **2185**

Observations of wave velocity and attenuation in two-phase media, *G. W. Purnell* **2193**

Water-gun cavity collapse in a compressible liquid, *P. M. Krail* **2200**

VERTICAL SEISMIC PROFILING

A recursive method for the separation of upgoing and downgoing waves of vertical seismic profiling data, *F. Aminzadeh* **2206**

BOREHOLE GEOPHYSICS

Borehole field calibration and measurement of low-concentration manganese by decay gamma rays, *J. L. Mikesell, F. E. Senftle, T. A. Lloyd, A. B. Tanner, C. T. Merritt, and E. R. Force* **2219**

COAL GEOPHYSICS

Maximum entropy analysis of dispersed seismic waveforms, *K. B. Cox and I. M. Mason* **2225**

ELECTROMAGNETIC METHODS

Induced-polarization and electromagnetic modeling of a three-dimensional body buried in a two-layered anisotropic earth, *Z. Xiong, Y. Luo, S. Wang, and G. Wu* **2235**

SHORT NOTES

A stable free-surface boundary condition for two-dimensional elastic finite-difference wave simulation, *J. E. Vidale and R. W. Clayton* **2247**

Inversion of aeromagnetic data for multilayered crustal models, *M. Pilkington and D. J. Crossley* **2250**

DISCUSSION

Reply by author (*J. H. Karl*) to discussion by T. R. LaFehr and K. C. Chan on "The normal vertical gradient of gravity" 2255

DEPARTMENTS

Letter to the Editor 2259
Reviews 2260
New publications received 2262
Patent abstracts 2263
International scientific advances 2266
Contributors to this issue 2268
Next month in GEOPHYSICS 2270
Announcements: Call for papers for SEG's 1987 Meeting in New Orleans 2271
Calendar of events 2272
Index to Volume 51 2273
Professional directory A-10
Advertisers index A-14